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U1S S1886

(56) Documents Cited
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DE 1 775 377
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# (54) Non-return device

(57) A non-return device 1 comprises flexible, impervious wall members 7, 9 of complementary shapes disposed face to face in surface contact so that there is no through passage between them in their normal state and resiliently urged into the said normal state, and means 13 holding the said walls spaced from one another at an end of the device to define an inlet 11 for ingress of fluid to the interface of the said members 7, 9, whereby inflowing fluid will force the said members 7, 9 apart to permit flow between them from the inlet 11 and to the other end of the device 1. Flow in the opposite direction is prevented by the close surface contact between the members.

Thus, in their normal state, the mutually contacting wall members 7, 9 prevent flow between them towards the inlet, but fluids entering the inlet can force the wall members apart and flow between them. The device can form an odour trap for domestic plumbing.

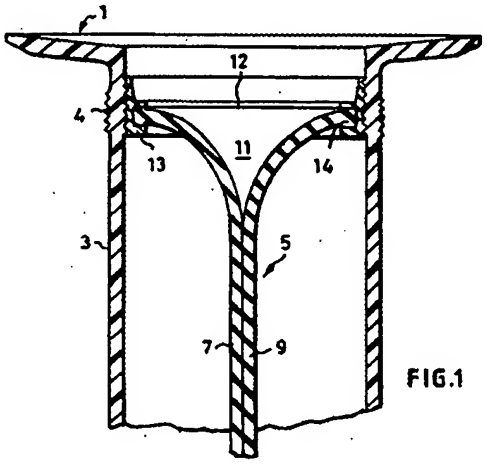


FIG.1

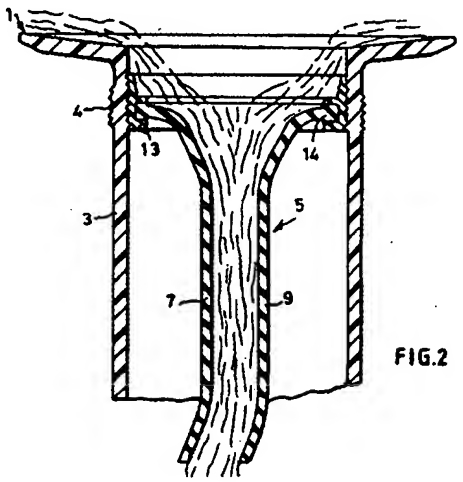


FIG.2

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

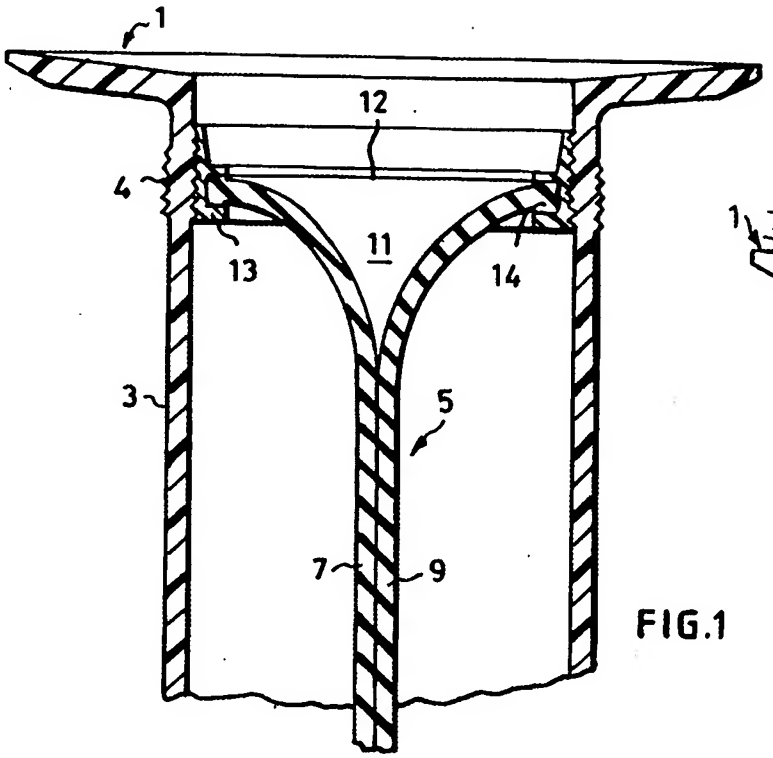



FIG.1

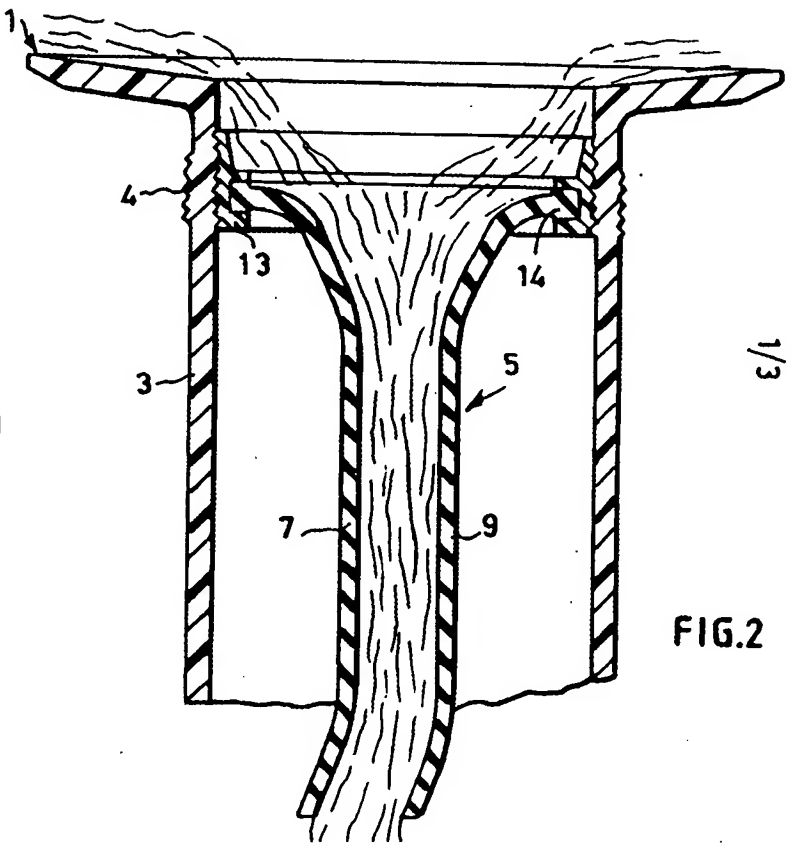



FIG.2

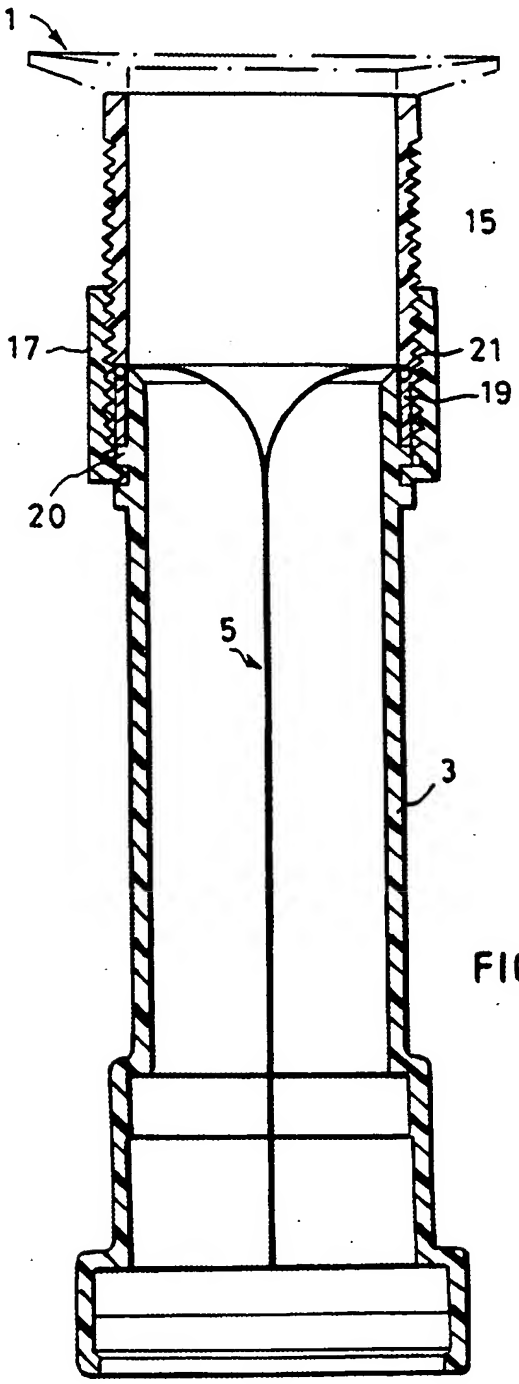



FIG.3

FIG 4a

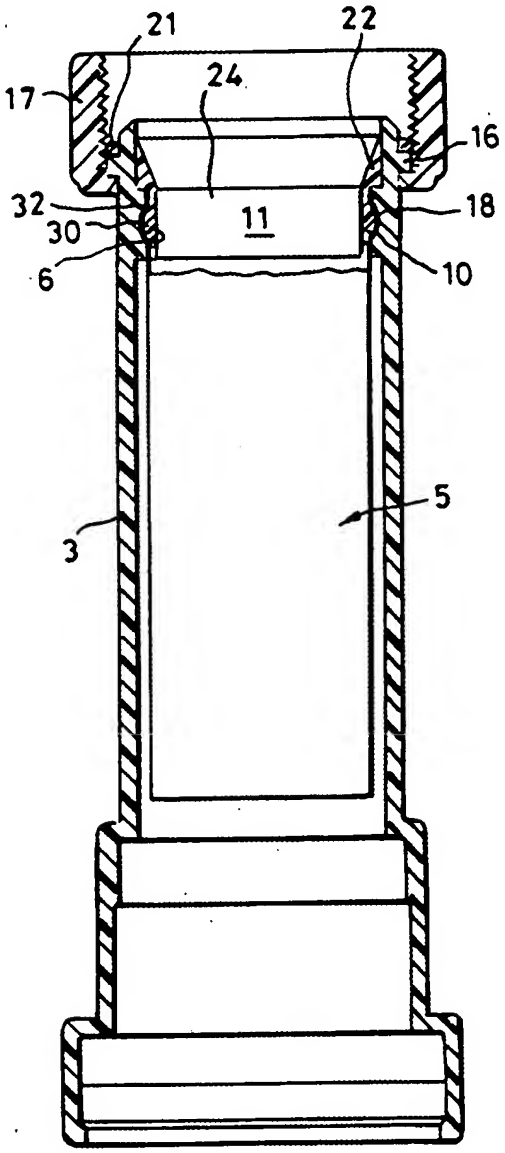
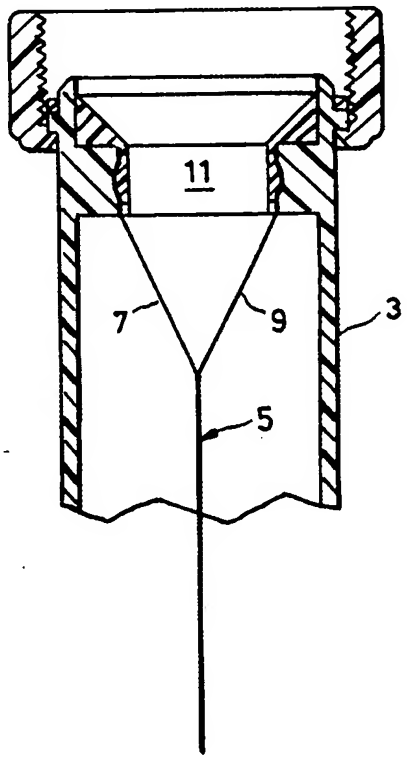



FIG.4b



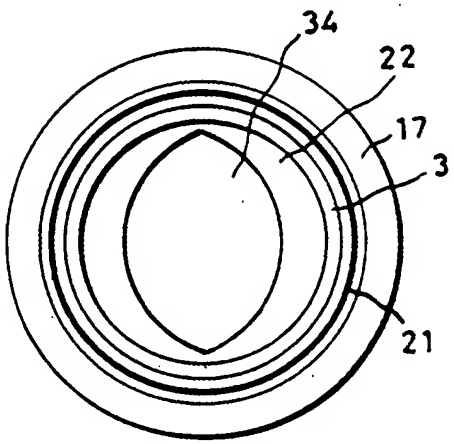




FIG.5

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# NON-RETURN DEVICE

This invention relates to non-return devices, with particular but not exclusive reference to waste and/or odour traps for domestic and other plumbing.

Conventionally, sinks, baths, shower cubicles and the like are provided with waste traps to provide a barrier between the sink or the like, and the waste pipe. These are intended to prevent the escape of unhealthy emissions and unpleasant odours.

The most usual form of waste trap is a bend containing water. Water held in the bend prevents the release of gases and vapours from the waste pipe, while permitting passage of water and solids.

Water traps, although simple and effective, have disadvantages. In particular they occupy a significant amount of space and may be difficult to install and maintain where space is limited. They not infrequently become blocked or dry out and can back-siphon. Moreover they can act as collecting points for undesirable material and even organisms.

Mechanical waste traps have therefore been proposed, mainly with the object of reducing the size required for the waste trap, but also with a view to overcoming the other above described problems associated with waste traps. For example, WO 92/14888 discloses a waste trap consisting of a conical elastomeric diaphragm.

An object of the present invention is to provide a simple and reliable waste trap, which can be used in place of a conventional water trap and which is capable of being easily installed in a limited space.

According to the present invention, a non-return device comprises of flexible impervious wall members of complementary shapes disposed face to face in surface contact so that there is no through passage between them in their normal state and resiliently urged into the said normal state, and means holding the said walls spaced from one another at an end of the device to define an inlet for ingress of fluid to the interface of said members whereby inflowing fluid will force said members apart to permit flow between them from the inlet and to the other end of the device, whereas flow in the opposite direction is prevented by the close surface contact between the members. Thus, in their normal state the mutually contacting wall members prevent flow between them towards the inlet but fluids entering the inlet can force the wall members apart and flow between them.

At the other or outlet end of the device the said members should be normally maintained in close contact to prevent reverse flow into the region of the interface between them.

Such a device, used as a waste trap, can provide reliable odour sealing, with a relatively short length and with a diameter which need be no more than that of standard waste pipes. It can be installed so as to be accessible through the waste outlet of a sink or the like so that it can be easily kept clean.

The members are preferably urged into mutual surface contact by their own resilience, but alternatively or in addition further resilient means, e.g. a spring clip. may be provided to press them together.

Preferably, the said wall members are respective wall regions of a tube of resilient elastomeric material designed to have a normal configuration in which the wall regions lie substantially flat in contact with one another.

Preferably, in particular for use as waste trap, the device further comprises a pipe within which the said wall members are mounted.

The said wall members or lie-flat tube can be made of any suitable material but are preferably thin-walled natural or synthetic rubber.

Waste traps embodying the invention will be described by way of example and with reference to the accompanying drawings, in which:-

Figure 1 is a vertical cross section of a waste trap which is a first embodiment of the invention;

Figure 2 is the waste trap of Figure 1 in a discharge condition;

Figure 3 shows an alternative embodiment of a waste trap in accordance with the invention;

Figures 4a and 4b show mutually perpendicular vertical cross sections of a third embodiment of a waste trap in accordance with the invention; and

Figure 5 shows an end view of the waste trap of Figure 4.

Figures 1 and 2 show in vertical cross-section a first waste trap embodying the invention. These figures show a sink waste outlet fitting 1 integral with a waste pipe 3. These components are made of plastics and/or metal. The outlet fitting may incorporate a conventional strainer or grille, and can be fixed in place by a nut or ring screwed on an external thread 4.

A thin-walled lie-flat rubber tube 5 is placed inside the waste pipe 3. The tube 5 comprises two opposite flat walls 7, 9 connected to each other, with sharp creases where the flat walls meet, extending along the length of the tube. The tube is manufactured in such a way that, in its normal relaxed state, the opposite flat walls 7, 9 lie in face to face contact with one another under light pressure due to the resilience of the material of the tube.

The lie-flat tubing is made from silicone rubber and has a wall thickness of less than 1 millimetre. The tubing should be resistant to temperatures of less than 0°C and up to 100°C. It should also be chemically resistant to acids and alkali and general household solvents, cleaning agents, oils and fats, in particular.

The manufacture of lie-flat tubing is known and therefore the structure and manufacture of the tube 5 will not be described in further detail.

At the upper end of the tube, its walls are held apart from each other, so as to form an inlet region 11 with a circular inlet opening 12. This is achieved by securing the periphery of the tube, at the upper end, to the wall of the waste fitting 1 or waste pipe 3, directly, or indirectly through a mounting ring 13 screw-threaded into the fitting or pipe. The periphery of the tube can be held in place for example mechanically by having its rim clamped, by an adhesive, by solvent or other welding, or by being manufactured integrally with the waste fitting or waste pipe by co-moulding. It may have a peripheral bead 14 to assist fixing it in a groove in the ring 13 or in the fitting or pipe.

The tube is secured in such a way as to form a gas seal around its entire periphery at the inlet end. In the relaxed condition shown in figure 1, the lower part of the tube is effectively closed because its side walls 7, 9 lie in contact. As a result, odours cannot escape upwardly from the waste pipe 3.

When water is discharged into the waste pipe, as shown in figure 2, it forces apart the walls of the tube 5, which have little stiffness. Water, and entrained solids, can therefore easily flow downwards through the tube 5. As soon as the flow ceases, the resilience of the tube material causes the flat side walls to return to their contacting and sealing condition shown in figure 1, forming a seal and preventing the escape of odours.

If the outlet fitting has a removable strainer, the tube 5 is directly accessible through the sink outlet after removal of the strainer, for cleaning or maintenance. It may also be made readily removable through the waste outlet for maintenance or replacement.

The figures show the waste trap and waste pipe installed vertically. However, the waste trap will operate satisfactorily if installed at an angle to the vertical, provided that there is a sufficient fall or pressure to cause waste water to force the walls of the tube apart.

Figure 3 shows another waste trap. In this case, the sink waste outlet fitting 1 has an integral stub pipe 15, with an external screw thread. The waste trap pipe 3 fits at its upper end into the lower end of the stub pipe 15 and is held in place in the latter by a screw cap 17.

At its upper end, the lie-flat rubber tube 5 is folded back on itself so as to overlie the upper end and the upper outer side surfaces of the pipe 3, and is held in place on the latter by a cylindrical plastics clip 19 outside the rubber tube and pipe.

A collar or flange 20 on the pipe 3 is pressed against the lower end of the clip by the screw cap 17.

A rubber seal 21 is provided between the clip 19 and the end of the pipe 15.

The clip 19 and the upper end of the pipe 3 hold open the upper end of the lie-flat rubber tube, forming a circular inlet opening as in the case of figure 1. The upper end of the rubber tube is set a certain distance below the waste outlet, so that a head of water can build up within the stub pipe 15. The corresponding head of water will increase the pressure tending to open the walls of the rubber tube, so that the latter can be made to close more strongly to enhance the odour sealing effect. The described construction may also provide for a volume of water to remain trapped in the pipe 15 above the rubber tube, to provide a further odour seal.

At the lower end of the trap pipe 3 is a standard joint or union arrangement for coupling to standard waste piping. The upper end is a standard coupling to join directly to the wash outlet.

Figures 4a, 4b and 5 show a third embodiment of a waste trap. This waste trap is intended to be fitted to a stub pipe such as stub pipe 15 which is shown in Figure 3. To achieve this, a screw cap 17 similar to that provided on the waste trap of Figure 2 is provided. The waste trap pipe 3 fits at its upper end into the lower end of the stub pipe and is held in place in the latter by the screw cap 17.

At its upper end, the lie-flat rubber tube 5 is held in position within the upper mouth of the pipe 3 by means of a pushfit collar 22. The collar 22 is provided with radially external annular rib 18 on a lower portion 30 which snaps within a corresponding annular recess 6, which is moulded into a seat region 32 of the inner wall of the tube 3.

The lie-flat rubber tube is first fitted over the lower portion 30 of the collar 22 and this is subsequently snapped within the seat region 32 of the mouth of the pipe 3, so as to

retain the mouth of the upper end of the lie-flat rubber tube 5 sandwiched therebetween.

As in the Figure 2 arrangement, an annular elastomer seal 21 is provided co-axially about the end of the pipe 3.

The lower portion 30 of the collar 22 and its central aperture 34 (see Figure 5) are both is somewhat oval in shape. The seat region 32 of the mouth portion of the pipe, into which this lower portion 30 snaps, is also correspondingly oval. This can be seen by comparison in Figures 4a and 4b. The collar 22 and seat 32 have this oval shape because the tube does not have circular symmetry, so an oval configuration provides a more even and secure grip around the neck of the tube and does not tend to urge it open, except at its very end, thereby enabling the two flat surfaces of the tube to contact along a good proportion of their length.

It will be seen that the waste trap occupies no more space sideways than a length of waste piping and is therefore much more compact than a water trap. Furthermore access for installation and maintenance is easy. For example, floor boards will not need cutting when a bath or shower is installed.

In the described waste traps, the opposite walls of the flat tubing remain normally in contact with one another because of the inherent resilience of the tubing and in particular because of the effect of the sharp creases or folds at the longitudinal edges of the tubing. Alternatively, or additionally, the walls of the tubing can be urged together by one or more clips, bands, or other additional resilient pressure-exerting elements provided on the tubing, and/or in the waste trap pipe. It is to be understood that the forces urging the pipe walls together must be sufficiently weak to be overcome by water being discharged.

In operation, the fitting may be placed either vertically or horizontally, or indeed at any angle between these two extremes.

The waste trap may be so designed that the lie-flat tubing can be removed upwardly through the sink waste fitting for maintenance, cleaning or replacement.

The trrap can be provided as a cartridge which may be replaceable.

## CLAIMS

1. A non-return device comprising flexible impervious wall members of complementary shapes disposed face to face in surface contact so that there is no through passage between them in their normal state and resiliently urged into the said normal state, and means holding the said walls spaced from one another at an end of the device to define an inlet for ingress of fluid to the interface of said members whereby inflowing fluid will force said members apart to permit flow between them from the inlet and to the other end of the device, whereas fluid flow in the opposite direction is prevented by the close surface contact between the members.

2. A non-return device according to Claim 1, wherein at the said other end of the device the said members are maintained in close contact to prevent reverse flow into the region of the interface.

3. A non-return device according to Claim 1 or 2, wherein the members are urged into mutual surface contact by their own resilience.

4. A non-return device according to any preceding claim, wherein resilient means is provided for pressing the members together.

5. A non-return device according to Claim 4, wherein the resilient means is a spring clip.

6. A non-return device according to any preceding claim, wherein the device further comprises a pipe within which the said wall members are mounted.

7. A non-return device according to any preceding claim, wherein the said wall members are respective wall regions of a tube of resilient elastomeric material designed

to have a normal configuration in which the wall regions lie substantially flat in contact with one another.

8. A non-return device according to Claim 7, wherein the tube is made from thin-walled natural or synthetic rubber.

9. A non-return device substantially as hereinbefore described with reference to Figures 1 and 2; Figure 3; or Figures 4 and 5 of the accompanying drawings.

The Patent Office

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|---|---|---|---|
| **Application No:** | GB 9425991.8 | **Examiner:** | Alan Blunt |
| **Claims searched:** | 1 to 9 | **Date of search:** | 28 February 1996 |

## Patents Act 1977
## Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): F2V (VP101, VP102, VV3)

Int Cl (Ed.6): E03C 1/22, 1/28, 1/298; F16K 15/14, 21/04

Other:

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | | Relevant to claims |
|---|---|---|---|
| X | GB1600743 | (HADDRELL) | 1to 8 |
| X | GB1534157 | (PHILTON POLYTHENE) | 1,7,8 |
| X | GB1151909 | (COLEMAN) | 1 to 8 |
| X | GB1088403 | (HEIMLICH) | 1 to 8 |
| X | GB754497 | (AB LINDEROTHS) | 1 to 8 |
| X | US4227533 | (GODFREY) | 1 to 8 |

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| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention. |
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